



# From Climate Variability to Climate Change: Challenges and Opportunities to Extension

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## Goal

- How do we expand our existing climate variability extension program to handle climate change issues?
- Hypothesis: By developing adaptation strategies to help producers mitigate risks associated with seasonal climate variability we are already addressing climate change.

## SECC Extension Program

- Focus on helping agricultural and natural resource managers mitigate risks associated with climate variability
- Based on:
  1. Forecasting seasonal climate;
  2. Anticipating impacts;
  3. Suggesting adaptation strategies for the main crops in the SE USA



## Climate Change Scenarios (Southeast) British Hadley Centre Global Climate Change Model

- Temperature:
  - Max. summer increase by 1.3°C (2.3°F) on average and max. winter increase by 0.6°C (1.1°F) by 2030
  - Mean annual increases of 1°C (1.8°F) by 2030 and 2.3°C (4.1°F) by 2100
- Precipitation: slight increase (3%) in the next 30 years and a larger increase (20%) by the end of the century

In summary a slightly wetter and warmer future for the Southeast

## Climate Change Concerns for Agriculture

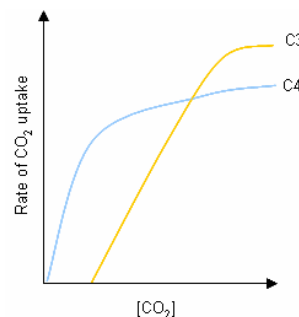
- Carbon dioxide levels
- Temperature
- Water availability
- Cloud cover
- Weather extremes

## CO<sub>2</sub> Levels

Increase in CO<sub>2</sub> => photosynthetic rates (CO<sub>2</sub> fertilization effect, mainly C3 plants such as wheat, rice, soybeans)

## Temperature

- Higher temperature will lengthen growing seasons in higher latitudes
- May have adverse impacts in regions where temperature is already close to optimum
- Higher temperatures speed crop development



## Weather Extremes

- Hurricanes
- Short periods of extremely high or low temperatures
- Droughts
- Torrential rains
- Strong winds

## Potential Impacts

- The expected variability of temperature, precipitation, atmospheric carbon content, and extreme events are expected to have profound effects on plant growth and yields, crops, soils, insects, weeds, diseases, livestock, and water availability

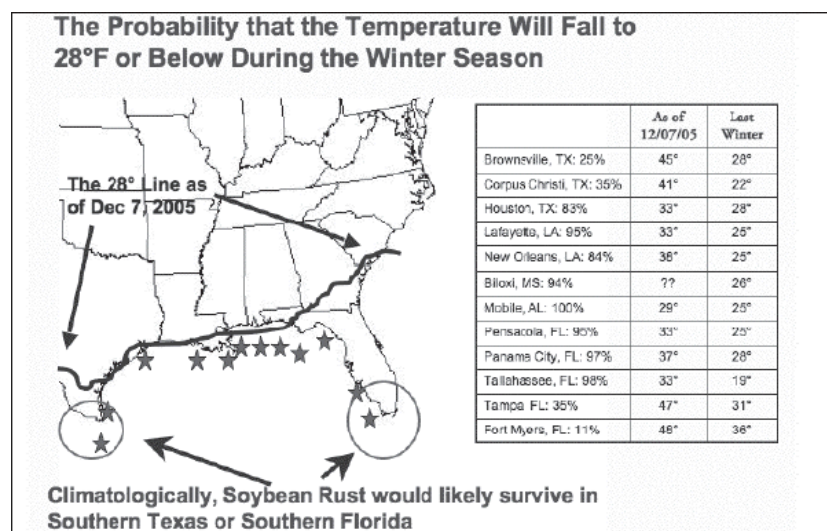
### Plant Diseases Asian Soybean Rust

- Caused by the fungus *Phakopsora pachyrhizi*
- Long known to occur in Asia, spread to Africa and S. America last 10 years
- Yield losses from 10 to 90% reported in other parts of the world



Source: Gregory Shaner

### Winter Survival



Survives on green host plants

Source: X. B Yang  
Iowa State University

### Other High Impact Diseases

Citrus Canker - USDA announced in January 2006 that eradication program would be canceled due to the large spread of the disease causing bacteria during the hurricane seasons of 2004 and 2005

### Livestock – Heat Stress

Dairy cows are very sensitive, optimum milk production between 40 and 75°F

### Climate Change Extension

- Adaptation strategies
- Mitigation?



- Adaptation strategies
  - Replace ENSO-based forecasts with scenarios, evaluate strategies such as planting dates, varieties => to guide research and long term strategy
  - Document local evidence, National Phenology Network
- Mitigation
  - Stress education component, partner with extension programs on soil management, biofuels

### Vision For a Combined Program

